

# MEADOWLAND MEETS ITS MASTERS

*Far-Sighted Firms, Inspired by New Engineering*

*Advances, Erect Plants in Once-Forbidden Marshland*

By JOHN T. CUNNINGHAM

**W**ALTER F. NILSON is the kind of affable, believable optimist who could sell electric blankets at the Equator, but when he approaches a potential customer for a site in his 500-acre Industrial Parks at East Rutherford he encourages the prospect's imagination to dwell on thoughts of sinking into an oozing, uncharted swamp.

"Come out to East Rutherford and we'll go for a boat ride; I'll show you the land under water," he says. If the customer seems to be more the walking than the boat-riding type, the pitch is varied: "Let me show you a

*The most undersold story of the Jersey Meadows is the quiet, undramatic account of reclamation in the 20th century. Eighth of a series.*

spot where you can put up your building today and 20 years from now walk out on a nice roof level with the ground."

Should this appear to be the world's worst selling technique, let Mr. Nilson explain:

"They usually believe these things anyway, so we might as well start even. I acknowledge every wild tale ever told, then I set about selling the simple fact that ANYTHING can be built on the meadows."

**T**HIS through-the-soggy-back-yard approach makes sense. The mythology and folklore of the Jersey Meadows is so overpowering—and, let's face it, so fascinating—that straightforward discussion of engineering techniques is difficult. Reclamation has been proceeding without fanfare for 50 years, but most people prefer to shudder at the thought of an unconquerable wilderness only three miles from Broadway.

So, Mr. Nilson lets them shudder—then he sells. Thus far, in two years, six large buildings have been erected in the tract. "And I darn well better put up buildings that won't collapse," he declares.

That isn't too difficult, really. No

engineer well versed in meadowlands development doubts that the 20,000 to 25,000 acres of unreclaimed meadows can be conquered. They believe that every necessary construction technique is in hand. Engineers vary in their approaches to development, of course, but they can agree with this flat statement: Every bit of the Jersey Meadows can be reclaimed.

Should that seem a strong declaration, consider what already has been built: two bustling airports, a thriving seaport, several massive electrical generating stations, many refineries and petroleum distribution centers, numerous truck terminals, huge railroad yards, great bridges and the embankments to carry the New Jersey Turnpike over the marshland. There are numerous heavy industries, such as those clustered between the Hackensack and Passaic rivers on Kearny Point. The most undersold story of the Jersey Meadows, you see, is the quiet, undramatic account of reclamation within the 20th century.

**E**NGINEERS generally do not appear excited about their work (which probably is why people prefer reading about muskrats), but an exception is tall, courtly Rofoel Blonk, Public Service Co. engineer who has been building electrical generating plants on the meadows since 1923. For him, "There is nothing dull about the work out there!"

Mr. Blonk probably has seen more piles sink into the damp muck than any other living man. "If you build anything heavy on green meadow land, you need piles," he says without reservation. "Or at least we do. With turbines costing 14 million dollars apiece, you take no chances."

Down and down have gone Public Service piles since Mr. Blonk began work in 1923: 30,200 for the plant at Kearny, 1,500 under a 150-foot tank at Marion, 16,000 to support the plant at Sewaren, 8,700 beneath the plant at Linden, 3,900 under the plant now being finished at Ridgefield. That's piles enough for any man's lifetime.

Pile driving proves how buttery the meadows are beneath the surface mat.

Often one blow of the pile driver sinks a pile 40 or more feet straight down. Mr. Blonk retains a beginner's delight: "That first drive is a pip; you put the hammer on a pile and it goes phfft!"

**P**ILES usually are of wood, ranging from 25 to 80 feet long. At Ridgefield, however, where the depth to stable underground averaged 110, and occasionally 150 feet, concrete pilings had to be used because wood piling that long is not available. Sometimes steel is used, but wood is preferred.

Wood, in that muck? "Certainly," replies Mr. Blonk. "Wood under water will last 2,000 years; steel will last maybe 100 years—steel and water don't get along too well, you know."

Experience has taught Mr. Blonk that nothing is taken for granted in the Jersey Meadows. At the Kearny plant, begun in 1923, one corner of the building rests on solid rock beside the Hackensack River; the other side of the building gets its stability from piles as much as 150 feet long. At Ridgefield, Public Service a few years ago built a switching station on solid ground—but only 2,000 feet away, where the Ridgefield (Bergen) plant is being erected, solid ground is 150 feet below the surface.

Mr. Blonk doesn't let himself become overconfident. Every job brings a new challenge, and the Ridgefield generating station reaffirmed his awareness that the best sunken piles can come near to grief in the slippery, oozing underground layers of clay.

**"W**E were in trouble up there last year," Mr. Blonk told me with a candidness not common among builders. "We had our piles in and were moving along on the foundation when the thing shifted about five inches. That clay is like a lubricant, you know; the piles slid."

The grinding force of the moving piles crushed 24-inch steel I-beams as if they were thin boards. A shift of five inches might not seem much, but in a building as ponderous as an electrical generating plant five inches is a worrisome movement. Public Service engineers considered themselves

fortunate that the shift occurred when it did—but even at that, Mr. Blonk said, the work was set back many weeks.

Obviously the shifting was overcome. The Bergen plant is no Leaning Tower of Ridgefield, nor will it ever be. It's solid as rock.

Should you be thinking of building on the meadows, something like a 50-story skyscraper, for example (the Bergen generating plant is equivalent to 50 stories in weight), don't overlook the need for money. Here is one place where piles come in money.

"We spent \$36 a square foot on piling at Ridgefield," Mr. Blonk told me. "That totaled \$2,800,000 for 80,000 square feet—almost one million dollars more than we figured on, by the way."

**O**CCASIONALLY there are those who wonder why the meadowland level simply isn't raised 10 feet or so by dumping in fill or garbage. Fill also poses financial problems. Public Service bought a small mountain at Newburgh, N.Y., to get a million cubic yards of fill for the Ridgefield plant.

"Incidentally," Mr. Blonk declares, "fill is getting mighty tough to get in







New Jersey. Garden State Parkway and New Jersey Turnpike ate up most of it; what's left can cost as much as \$2 a cubic foot.

For another thing—and this is even more serious than money—fill placed improperly on the meadows mat can disappear like ice cream in July. If fill is placed too rapidly, the underlying clay can suddenly liquefy and, phfft, just like the piles, down goes the fill. As the fill disappears, the meadows mat rises on one side or the other, or on both sides, in the way of mud squishing up around a boot stomped in wet ground. Engineers call this phenomenon in the meadows a "mud wave."

Mud waves aren't things of the past, even with modern engineering techniques and knowledge. I saw such waves on the Elizabeth meadows last fall, risen on either side of a temporary dike built to contain fill being dredged from Bound Creek. The dike was gone, the waves lingered on. A much more noted mud wave was that created when highway builders placed fill too high and too fast for the bridge over Berry's Creek on Rt. 3 about a dozen years ago. Down went the fill,

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Port Newark illustrates major methods of meadowland reclamation: large-scale landfill. The 612-acre facility has 28 deep-sea steamship

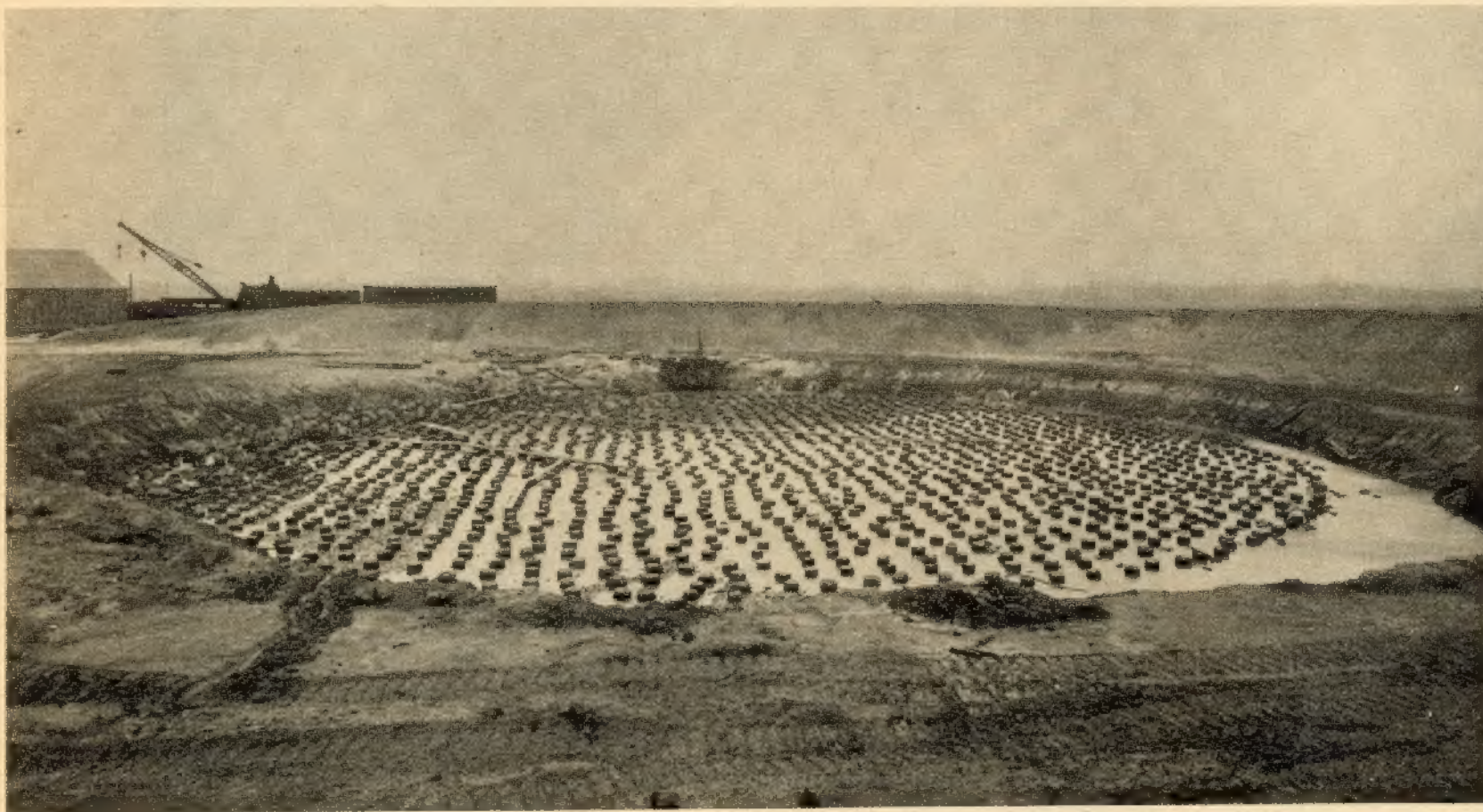
berths, plus 16,800 feet of wharves. Below, Newark's Mayor Raymond and his party arrive on excursion boat to see port in Oct., 1915.





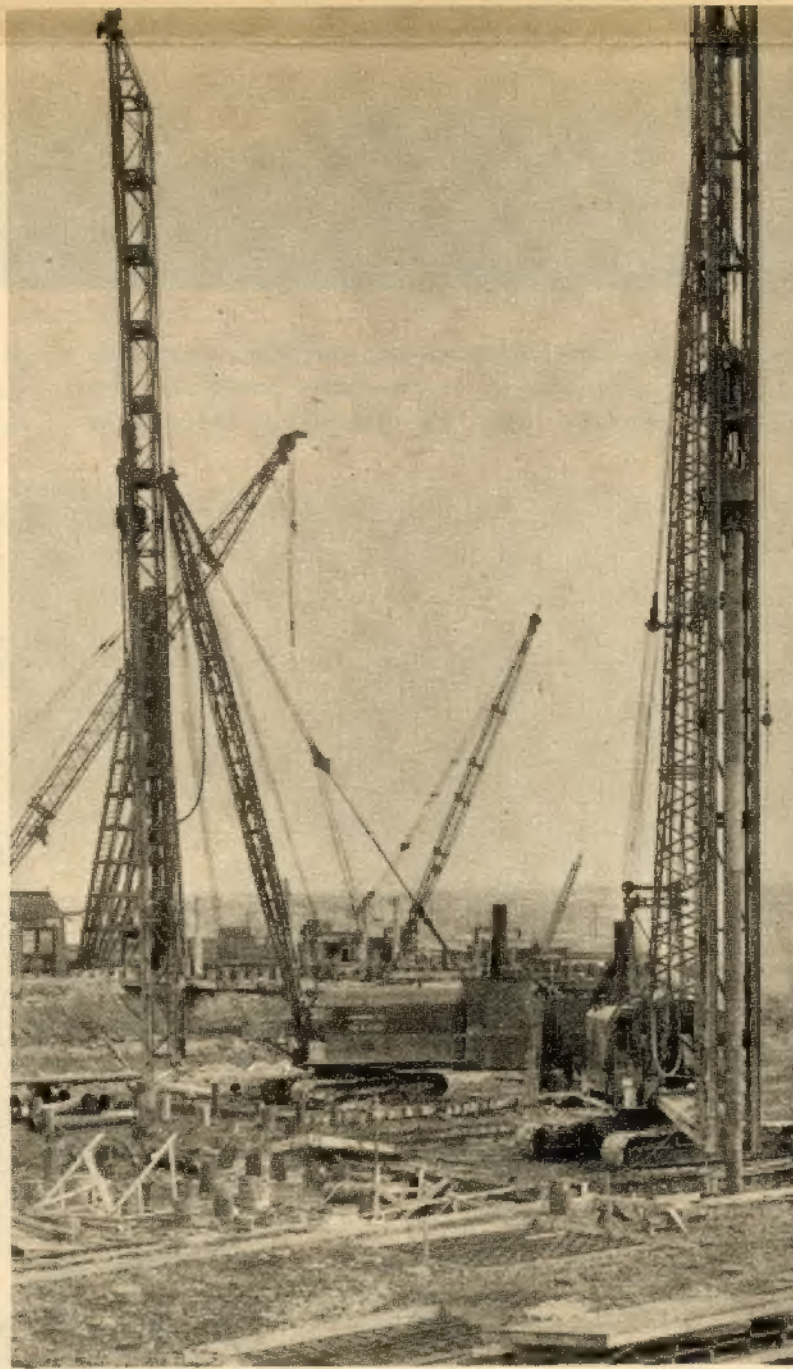
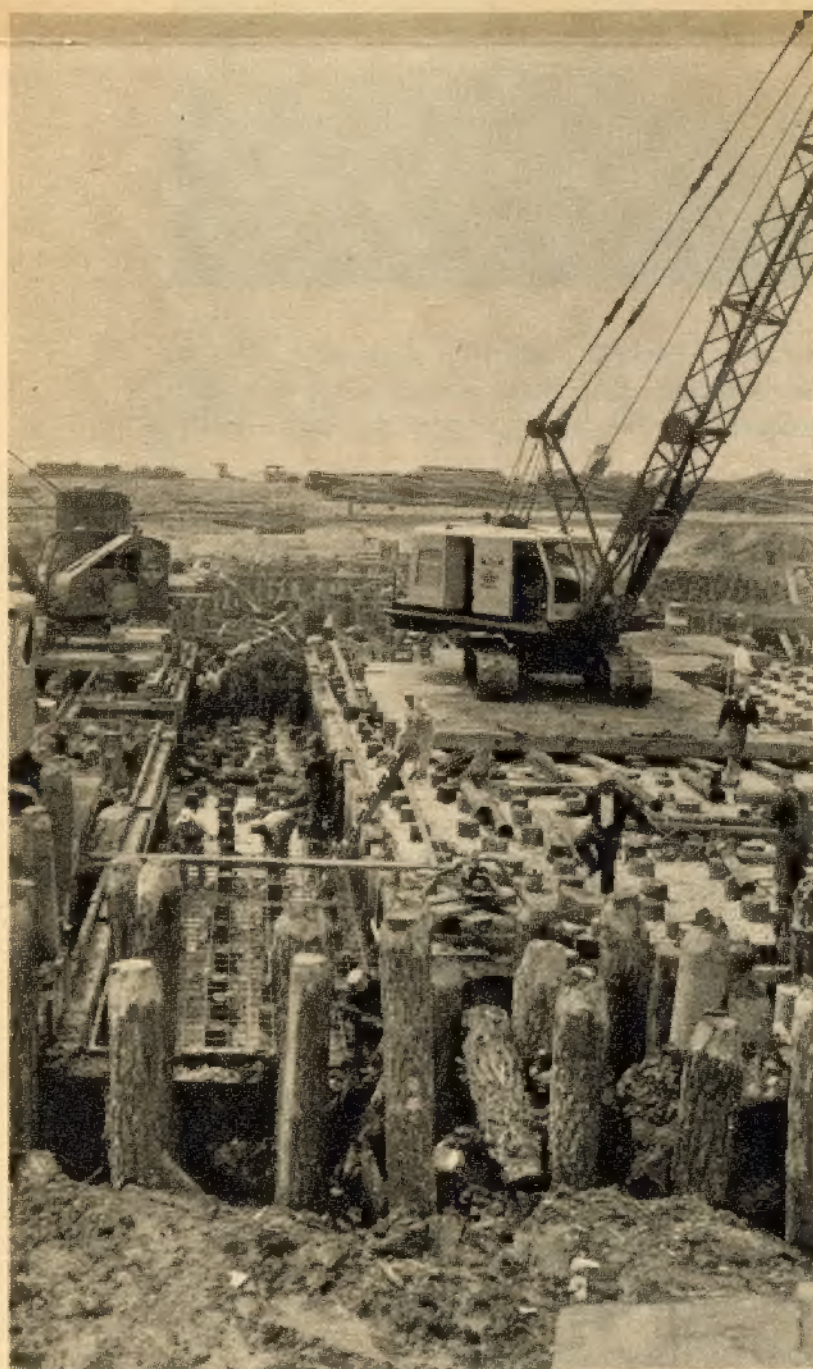
# MEADOWS MEET MASTERS

## One Way to Conquer Meadows



Public Service Co. has tamed meadows for its plant sites by use of piles. Above, wooden bed for oil storage tank at Sewaren laid in 1947.

Below, left, a similar operation for the Linden generating station. Right, drivers slam piles to 150 feet for base of new Ridgefield station.



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up came a wave a thousand feet away—and the meadows reclaimed the fill, instead of vice versa.

**T**HE collapsing soil at Berry's Creek cost the state something like \$500,000, but it proved a blessing in muddy disguise—because it brought engineer O. J. (Jim) Porter and his "sand drains" east from California to perform wonders on highway jobs on the meadows. State highway engineers called on Mr. Porter, his drains worked at Berry's Creek and subsequently caused wondrous stabilization of other sections of Rt. 3.

All who would like to take up sand drains as a hobby can read fully about them in technical journals. The drains work about like this:

A sand "blanket," about three feet thick, is placed atop the area to be consolidated. Steel cores (mandrils) are sunk through the blanket and deep into the sodden clay, then sand is pumped into the cores under pressure as the mandril is withdrawn. This creates a column of sand—a vertical drain. Finally, heavy layers of fill are placed atop the sand blanket to squeeze the soggy soil.

What happens is delightfully simple and wonderfully effective. The heavy fill doesn't collapse; it weighs down on the water-logged clay. The moisture squeezes into the sand drain, runs up to the surface as kerosene runs up a lantern wick, and at the surface the water seeps off through the sand blanket to the sides. The clay consolidates, becomes firm, and highways (or buildings, if desired) can be built with impunity.

The sand drains firmed up the shifty meadows to support the New Jersey Turnpike. Fifteen million cubic yards of fill had to be placed atop the meadowland to bring it up to grade; but first, 20 million cubic feet of soft undersurface had to be solidified and stabilized to keep the fill from collapsing in one grand mud bath.

**D**OWN went the drains—five million linear feet before the job was done—sometimes threading down to 100 feet, sometimes to a depth of only 12 feet. Millions of dollars were saved (four million dollars alone between the Hackensack and Passaic rivers), many months of time salvaged. The sand drain came of age, in New Jersey at least, as the New Jersey Turnpike inched across the meadows.

The Turnpike wasn't all a matter of "down with the drains and up with the water," nonetheless. Piers for bridges across the Hackensack and Passaic rivers had to go down to solid rock, 80 to 120 feet below the surface. Every square inch of those bridges rests on steel piles ranging in length up to more than 100 feet.

The works of Public Service and the accomplishments of the New Jersey Turnpike builders are monumental. Still, if only one Jersey Meadows



dreams come true could be singled out, it would have to be the Port Newark-Newark Airport development (coupled here as one because of the unusual sea-airport proximity). No project in the meadows exceeds this in scope, in imaginative enterprise or in fulfillment.

Lest it be thought that imagination and money have been products only of the years since the Port of New York Authority leased the twin avenues of transportation in 1948, recall that Port Newark dates back to 1907 and Newark Airport to 1927. The authority leased two facilities badly in need of succor, that's true; they also leased two enterprises founded in strength shown long before.

**P**ORT NEWARK and Newark Airport also illustrate a third prime method of meadowland reclamation: large-scale landfill. Piling and sand drains have been used in recent times in conjunction with fill at the port-airport, but in origin both essentially were dump-it-on-the-meadows-and-let-nature-take-its-course achievements.

First of all, there was Port Newark, officially on its way in 1907 when the State Legislature passed an enabling act to permit the City of Newark to buy land for a long anticipated seaport. "Long-anticipated" is an understatement. As early as 1854 a port plan was discussed in Newark newspapers; throughout the 1880s and 1890s all city maps had a "proposed ship channel" inked in.

Curiously, once the city was able legally to build the port, many former supporters found reasons to oppose action. But land buying went on—starting at \$80 to \$300 an acre, gradually edging up to \$1,500 when the first dredging began in 1915. Surrounding land rose as much as 11 feet above the meadows floor as dredged materials from the channel spread across the salt hay and cattails.

In October 1915 the city ran free excursion trains and boat rides out to the "port," although it really was nothing more than a muddy channel 7,000 feet long, 400 feet wide and 20 feet deep—but a whole lot more than most felt would ever be accomplished.

**W**ORLD WAR I uses (as a submarine shipyard and an Army base) slowed port progress, and not until 1922 did the first commercial steamboat leave port. Growth, if not spectacular, was steady; by 1936 Port Newark represented a multimillion-dollar investment on reclaimed land once dedicated only to malodorous garbage dumps and smoldering meadows fires.

Mayor Thomas Raymond, who kept the port hopes moving toward fruition, also touched off the Newark Airport boom. Whether he did it enthusiastically or resignedly depends on what old newspaper clippings you read—but at least he did it.

Lindbergh's flight across the Atlantic to Paris in May 1927 made the nation air-mad. Mayor Raymond, according to one newspaper (on the less enthusiastic side), declared: "This



Newark Airport, now one of the world's busiest, had humble beginning in 1928 when workmen cleared primitive runway, and the field boasted a single hangar.

young man has demonstrated it is possible to leave one field and reach another thousands of miles away without mishap. We might as well make up our minds to build an airport."

The mayor concluded that the Pulaski Skyway and the Holland Tunnel, both near completion then, would put Newark closer to 42nd St. and Broadway than most parts of New York City itself. His reasoning was not in line with that of the experts of the Port of New York Authority (which many believed had not in 1927 really conceded that New Jersey existed). The authority surveyed 10 possible sites and placed Newark next to the last in desirability.

**N**EWARK ignored this Port Authority slap and in January 1928 began to heave dredged material (out of the always-deepening ship channel) atop the frozen airport site. Eventually, 1½ million yards of wet fill built up a small mountain. On April 1 the first truckload of dry fill went on the mound.

City fathers were not fooling when they dumped the first earth on April 1, but nature took it as a bit of a joke. It rained for a total of 33 days between April 1 and July 15, and every rainy day made the morass so much deeper.

Everything was conquered by early fall as history well relates. Ironically, the one man who had worked most feverishly to finish the airport for a dedication on Oct. 10—Mayor Raymond—proved to be the one to hold up the scheduled opening. He died on Oct. 7; formal opening was delayed several days.

Both the port and the airport fell

on disquieting days just before and after World War II; the 50-year lease negotiated by the Port of New York Authority in 1948 has proved most vital. Port Authority dollars wisely spent (more than 36 million dollars on the airport, more than 50 million on the port), plus the initiative and leadership shown by the authority have moved Newark's unique seaport-airport-railroad-highway interchange into a leading position among transportation facilities on the east coast.

**W**ELL on its way as an adjacent twin of Port Newark is Port Elizabeth, a long step into the future (and a subject for discussion in the concluding article next week). The broad reclamation of the meadows at Port Newark and Newark Airport since 1915 proves very definitely that, given the leadership and money, the meadowland isn't the master of man.

Now back to Walter Nilson of the "admit-the-myths, then-sell-them" philosophy.

Thus far Industrial Parks Inc. has developed only an area between Rt. 17 and a branch of the Erie Railroad. Immediately ahead is a long extension of Union Ave. (East Rutherford) to reach once inaccessible flatlands. "We're going out to what people have called 'No Man's Land' for two centuries," he says.

Mr. Nilson builds his type of building without piling—"I'm dead set against piling, and I like to think I'm conservative. I looked at this clay for the first time in 1951 and, believe me, I was scared." However, he believes that the "softness" and the "instability" of the meadowland have far too long been stressed.

He is still cautious, but in defense of "no piles," he points out that buildings with five million square feet of floor space at Teterboro have been built on former meadowland without piling.

**I**NDUSTRIAL PARKS' engineers excavate about 10 feet below the meadow surface (removing, by the way, all the garbage once dumped in the belief it could reclaim the marshland). Then a mat of sand and gravel is laid, extending about 15 feet beyond the edges of projected buildings. This appears perfectly adequate for the type of warehousing and distribution buildings in the site (but Mr. Nilson agrees that each building must be custom planned—"You couldn't use a building planned for light loads for heavy industry.")

Someday, possibly before the entire 500-acre tract is reclaimed 15 years hence (if all goes well), Mr. Nilson hopes to erect a 10-story building in the Jersey Meadows. He doesn't believe piling will be necessary. You get the notion his tower will be more than an office building: It will be also a symbol of Mr. Nilson's abiding belief that engineering difficulties in the meadowlands have been overplayed.

"Practically to a man engineers in New York have agreed that you can't build out here without difficulty," he declares. "This 10-story building will mean that we can see into New York from the Jersey Meadows."

As a meaningful afterthought, he adds:

"More important, New York finally will be able to see us, too."

(Next Week: The Future Unfolds.)